



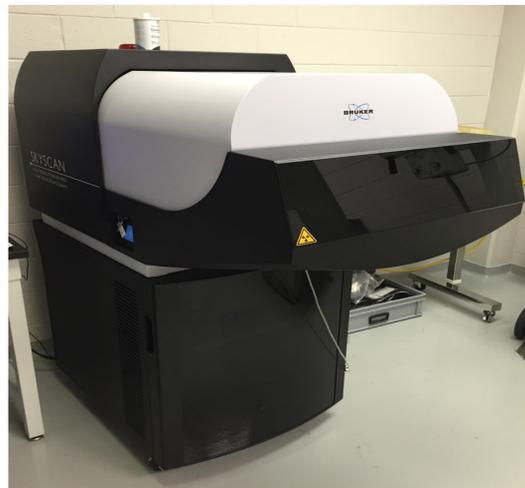
Imaging Methods for Structural Analysis of Bio-Inspired Designs



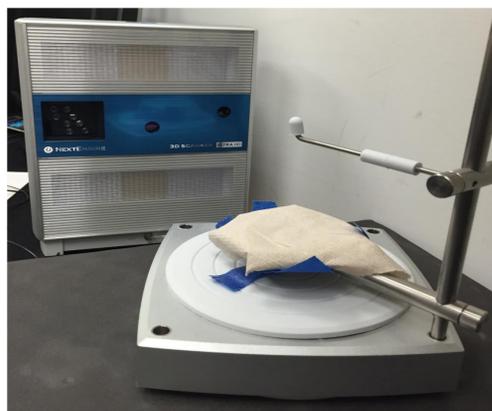
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Imaging Techniques



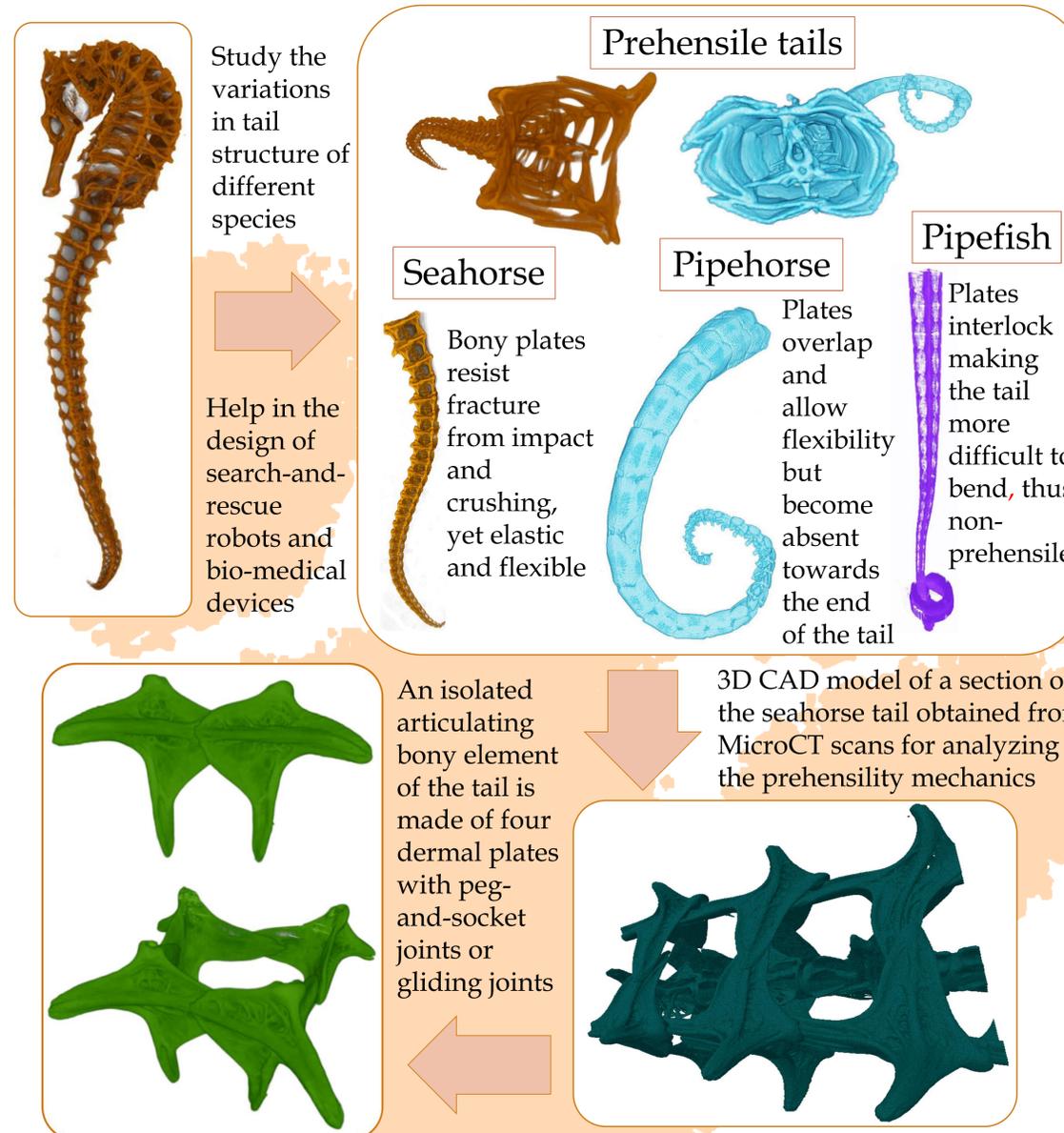
Bruker SkyScan 1176 high resolution *in-vivo* Micro-CT. Capable of performing scans with resolutions as small as 9 microns.¹



NextEngine Scanner Ultra HD 3D scanner. Scans with up to 0.127 mm accuracy with the capability to export scanned models to SolidWorks for analysis and redesign of the model.²

Understanding the Prehensility Mechanism

Reconstructed images from MicroCT scans of the Syngnathidae family of fishes

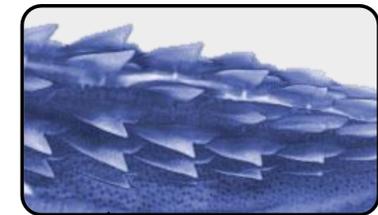


Acknowledgements

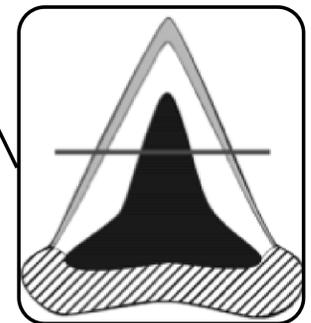
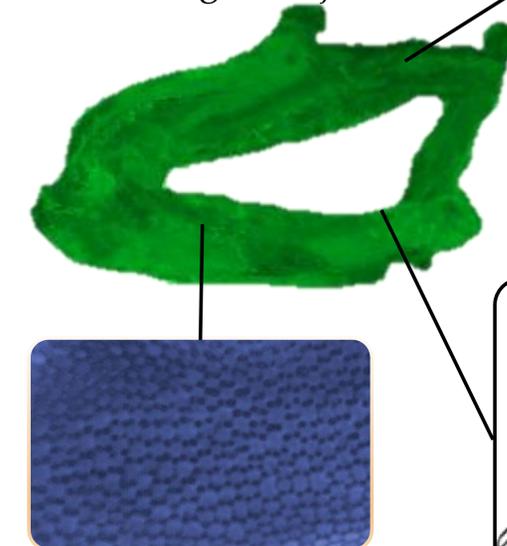
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Contributing Components to Chondrichthyan Jaw Rigidity

Polydontic jaw structure. Alternating staggered tooth pattern is hypothesized to increase the structural rigidity of the cartilaginous jaws.



3D scan of the jaw of a bonnethead shark jaw using the NextEngine Scanner Ultra HD.



The primarily hexagonal shaped tiled tesserae covering the sharks jaw. Tesserae normal to the loading direction have a significant impact on the effective modulus.

The tooth is a tough mineralized composite with three distinct layers: orthodontine (white), osteodontine (hatched), and enameloid (black).³

References

- [1] www.bruker.com
- [2] www.nextengine.com/products.com
- [3] Whitenack, L. B., Simkins, D. C., Motta, P. J., 2010, "Young's Modulus and Hardness of Shark Tooth Biomaterials," Archives of Oral Biology, 55(3) pp. 203-209.
- [4] Liu, X., Dean, M. N., Youssefpour, H., 2014, "Stress Relaxation Behavior of Tessellated Cartilage from the Jaws of Blue Sharks," Journal of the Mechanical Behavior of Biomedical Materials, 29pp. 68-80.